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Flipped Classroom in the Higher Education System: a Pilot Study in Finland and Russia

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Abstract

This article shows specifics of the transition from conventional educational practice to the Flipped classroom model in modern education system. It is focused on professors' perception of the video-based teaching approach. Conducted sociological survey involves the teaching staff from one European and one Russian university, namely the Lappeenranta University of Technology (LUT) and Ural Federal University (URFU). The survey investigated professors' awareness of the Inverted classroom, their readiness to employ it and prime barriers they face. Results reveal that teachers from Russia have less information about the model and practically do not embed it in the education arrangement comparing to professors from Finland. Lack of time, lack of support and assistance are shown to be the prime barriers preventing them from flipped classroom implementation. Drawn implications are of use for the integration of the flipped classroom.

Keywords: *flipped classroom, higher education system, professors' perception.*

1. Introduction

Social and technological changes affect all the spheres of our life including higher education. One of the breakthroughs in the last half century is the concept of blended learning. Generally, it is a modern educational approach where part of the content is delivered online and the remaining part is taught face-to-face.

It combines application of a variety of technologies to the traditional lecture. The inverted or flipped classroom is one in this vein. The flipped classroom has its roots in K-12 education in 2012 (O'Flaherty, 2015). It combines knowledge transfer partly through video before the class and various activities through communication in class.

Implementation of new technologies increases the dynamics of higher education. Adjustment of the teaching methods to the transforming needs and growing demand of innovative online education delivery services are the trends that increase the efficiency of education. Educators and universities have been adapting the learning process to the new generation, to Millennials, who have expectations and information consumption ways different from previous generations of students (Skiba and Barton, 2006).

Rapid development of teaching methods highlights the importance of theoretical and practical research in the field. "The more we know about effective uses of technologies for teaching and learning, the faster we can adopt these new practices, facilitate their proliferation across higher education, and increase student success" (Seaman and Tinti-Kane, 2013).

We believe that the study of teachers' awareness of flipped classroom implementation and review of the emerging challenges of its implementation will encourage and contribute to the satisfaction of students' needs, realization of universities' innovation potential and strengthening the positions of the modern teaching technologies in the higher-educational arrangement.

2. Background and Methodological Framework

Higher education system has been reproducing traditional models of education for several decades. According to Professor Cathy Davidson from Duke University, traditional education tends to be a disciplined way of learning by quiet sitting and individual problem solving (Bogost, 2013). Such isolation stands for lack of communication between peers and professors in class, where instructions do not become more personalized.

Traditional lecture refers to the teacher-centered approach. Lecture is an essential element of the traditional approach to education, which has its own form and characteristics. Philip Boffey (1962), from Harvard University, wrote about lecture as "a chief method of teaching", even though since 1962 it has had a huge number of drawbacks. Nowadays this is the leading form of information presentation and the most popular way of teaching in universities. Insufficiency in achieving

effective results in class performanceusing lecture in the digital era becomes a driving force for the future process rearrangement.

Lecture is a passive, not dynamic way of teaching that decreases students' attention and involvement (Bergmann, 2012). Subsequently, it affects students' learning process in the way of making them feel bored and quickly and easily forget the material. Student attention after 10 minutes of an unvarying narration significantly declines (Hartley, 1967), (MacManaway, 1970). Average spin (period of active learning) is no more than 20 minutes from the beginning (Stuart, 1978). Knowledge transfer through lecture stands for pure listening, which makes listeners remember just 5% of given information. Passive participation does not allow students to develop existing skills or to get new knowledge in the most efficient way. In addition, theoretical knowledge without involving different teaching forms limits learning and understanding of listeners.

The flipped classroom approach covers a number of important gaps in the traditional educational approach and brings strong advantages to the learners in the current digital era. The flipped classroom is an overall term for the reverse traditional educational arrangement. In some sources it is also called blended learning, the inverted classroom, condensed classroom, or post-lecture classroom (Plasencia, 2014; Bergmann & Sams, 2012). It is one of the most recently emerged innovative and popular technology-injected learning models. The term inverted classroom refers to 2002 (Lage and Baker) and the term "Flipped classroom» was introduced in 2012 by Bergman and Sams (Bergman and Sams, 2012). It combines a variety of technical tools. One group of techniques aims to create and reproduce video content (Jensen, 2015). "The core idea is to flip the common instructional approach: with teacher-created videos and interactive lessons, instruction that used to occur in class is now accessed at home, in advance of class. The classroom becomes the place to work through problems, advance concepts, and engage in collaborative learning" (Tucker, 2012). Most activities in class are automated by using clicker responses, low- or un-moderated online discussions, quizzes, etc. (Bogost, 2103). After the class, students can apply their knowledge and deepen the material.

The results of flipped classroom implementation efficiency vary in different studies. We present the results from 15 most cited articles and scoping reviews (O' Flatherty, 2015), where each study provides a comparative analysis of the flipped and traditional classroom. The majority of authors reveal an increase in students' satisfaction and scores as two main parameters that reflect the effectiveness of the flipped classroom implementation. Additional advantages of the flipped classroom include an increase in engagement (Strayer, 2012), an increase in face-

to-face communication (Baepler, 2014, Strayer, 2012, Kim, 2014), personalization of instruction, which means longer or higher quality time of communication between professors and students (Bergmann and Wilie 2012; Mary Beth Gilboy, 2014; Kim, 2014; Strayer, 2012). However, a few studies report no changes in student perception or scores (McLaughlin, 2014; Love, 2014; Baepler, 2014; Velegol, 2015) or even show a decrease in satisfaction (Missildine, 2013; Strayer, 2012).

Inconsistencies in the flipped classroom research results underline the importance of continuation of studies in this field. Among other issues, teachers' readiness to implement it, common and specific barriers they face, and the general perspective of this methodology in the future should be investigated.

3. Results and discussion

The proposed research targets shed light on teachers' actual level of awareness of the flipped video-based classroom approach. In addition, this study identifies challenges hindering the use of this model by professors in their own teaching practice. To achieve these aims, structured interviews were conducted in Russian and Finnish universities over the period of 2015–2016. The questionnaire consists of 11 questions related to the awareness and attitude of professors. The interviewed sample comprises 20 teachers from each university. The professors from the Lappeenranta University of Technology are representatives of the Industrial Engineering and Management Department from the School of Business and Management and in Ural Federal University the professors work in the Socio-Economic Department. In the Lappeenranta University of Technology the ratio of the male and female professors is approximately equal (some respondents preferred to keep anonymity). In Ural Federal University 16 women and 4 men were interviewed.

3.1. Professors' awareness and attitude to the flipped classroom

The level of awareness of the flipped classroom is considerably lower in the Russian university: only one respondent is familiar with the concept versus 10 professors who have heard about the flipped classroom and 3 who have practiced it in the Finnish university. We suppose that the severe lag of Russian professors can be related not to the lack of information available but rather to the language barrier. The language skills differ significantly in these countries. According to the English skills, the world's largest ranking of countries in 2016, Russia was ranked the 34th out of 72 countries, whereas Finland took the fifth place in the same ranking (EF, 2016).

The respondents from the Finnish university in general favor unconventional teaching approaches and the flipped classroom in particular. The results of the survey show that six teachers of the Lappeenranta University of Technology believe that the flipped classroom is one of the most effective approaches for class arrangement. Alongside with that, six respondents tend to think that a combination of different approaches is the most effective way of teaching: flipped classroom and active (two respondents) and traditional, active and flipped (four respondents). A considerable number of respondents prefer the active approach solely as the most effective one (four respondents). Therefore, the general opinion about the effectiveness of different approaches is ambiguous, with the flipped classroom approach prevailing.

In addition, we asked the respondents to find the most effective approach with respect to their own lectures. Here only two of professors from the Finnish University selected the flipped classroom as a single option. The remaining respondents preferred to use a combination with other approaches (traditional and active). Thus, it is believed that professors are not confident in spite of their initial familiarity with the inverted classroom, and innovative practice is at the initial stage towards wide dissemination in educational arrangement.

Regarding the Ural Federal University, the low level of awareness leads to the inability to give reasonable answers about the flipped classroom. However, 15 respondents tend to choose a combination of the listed active and traditional methods.

3.2. Required elements for transition to the flipped classroom

Further, our survey aimed to reveal perceived necessary conditions for implementing the flipped classroom concept in the teaching practice of the respondents. Taking into account the low level of awareness of this method in the Russian university, before proceeding with the survey, we familiarized the participants from the Russian university with the concept of the inverted classroom. Table 1 shows the results of this part of the survey.

Table 1. Flipped classroom transition conditions (number of respondents)

Conditions	Respondents from the Russian university	Respondents from the Finnish university
The arrangement of the process	12	14
Access to technologies	6	1
Supporting materials and resources for implementation	2	5
Total	20	20

After a basic review of the methodology background, the majority of the respondents from Russia highlighted the arrangement of the process as a necessary element for the transition to the flipped classroom. The rearrangement of the process was also emphasized by the majority of the professors from Finland. Essentially, rearrangement of the educational process requires new resources, skills, and knowledge from both professors and students. Teachers need to invest their time in the preparation of materials, development of in-class activities, and reflecting the new approach in the curriculum. The rearrangement brings about changes in time distribution for students as well. The share of time for self-study increases, as the theoretical or knowledge-transfer part of the teaching is shifted to self-preparation with videos and other material. Simultaneously, the in-class time is primarily devoted to activities and active interaction between students and the teacher. Therefore, careful preparation and development of a detailed implementation plan are the crucial parts of the transition process.

Both survey groups agree that the rearrangement is the pivotal requirement for the transition to the flipped classroom. However, with respect to other conditions opinions diverge. The teachers from Russia are more concerned about the lack of technological tools, whereas the teachers from Finland are more worried about the application ways. It can be justified by different overall resource supply in each university. Generally, Russian universities provide lower level technical equipment, such as laptops, tablets, video cameras and other tools. Moreover, there are no equipped e-learning labs in the Russian university. Contrariwise, the LUT's e-learning tool-kit accessible for everyone in the university satisfies all the basic needs for the flipped classroom implementation. Thus, the Finnish professors are more concerned about the practical ways of the flipped classroom realization, such as methodology, instructions, guides and other supporting techniques and materials.

3.3. Flipped classroom implementation barriers

According to the survey results, 18 respondents from the Lappeenranta University of Technology and 15 respondents from Ural Federal University express their interest in the flipped classroom implementation in their own courses. Despite the growing interest in the approach, its practical realization is hindered. Therefore, the next part of the survey addresses an important issue of the perceived barriers to the implementation of the flipped classroom. The list of barriers preventing diffusion of the methodology in the respondents' own practice is presented in Table 2.

Table 2. Barriers to the flipped classroom implementation

	Barriers	Russian teachers	Finnish teachers
1	Lack of time to develop and rebuild courses	16	12
2	There are not enough specialists in the field who can help with the development	10	7
3	Professors are not familiar with technologies	8	5
4	There are no technological tools for its realization	5	1
5	Students are not familiar with the method and do not prepare for class	3	4
6	There is no need to rebuild courses at all	2	2
	Total	44	31

The results of the survey demonstrate that the major challenge for the teachers is lack of time. More than a half of the participants emphasize this barrier among other things. It fully reflects the prime perceived component of the transition to the flipped classroom, "rearrangement of the process". Course reconstruction requires time for updating the content and developing completely new e-learning elements (videos, audio lectures, quizzes, class activities, instructions, etc.). Lack of time has its roots in the working time allocation. Commonly, besides teaching activities, professors are involved in scientific research, academic projects, educational program planning, etc. In both universities, participation in all kinds of teaching activities gives additional points leading to pay rise. In addition, various standards established in universities can play a significant role. For instance, in Ural Federal University the preparation time for one lecture is set to be no more than 30 minutes. Clearly, it is not enough for flipped classroom preparation for the first time. Therefore, the limitations established in the university, on the one hand, and motivation measures on the other can significantly affect transition to the flipped classroom.

Lack of instructors, assistants and specialists in the field is the second barrier affecting the implementation of the inverted classroom. Insufficiency of the assistance of technologists, video operators, programmers, and editors makes the transition process more complicated and slows down the design and development of the new courses. As long as professional support is one of the main factors defining flipped classroom quality, it defines efficiency and success of the course reconstruction. The teachers from both respondent groups find it difficult to resolve a number of issues without assistance. Which part of the content should

be recorded? How to plan the content, script for video recording? How to record a high quality video using professional equipment? How to share the video content? Which platform to use? How to arrange interaction using feedback systems in class? How and how often to update the materials? Instructional technologists, or ideally a rigorously formed e-learning team, can provide support for professors in terms of both technology and organizational issues. Development of e-learning courses, like the flipped classroom, creates demand for new roles and participants in the educational process. Thus, university administration becomes a central decision-maker.

What even worsens the situation is the lack of practical information about the implementation of the flipped classroom. The only vast source of information is academic papers that are not as convenient as, for instance, specifically arranged practical guides. An effective solution for this problem could be seminars, video training and pilot experiments for the professors.

Nevertheless, a wide range of already implemented technologies in education can become a first step towards inverted video-based classroom implementation (Table 3).

Table 3. Technological tools already used by teachers

	Tools	Russian teachers	Finnish teachers
1	Voting or test systems (Feedback systems)	20	15
2	Presentation software (PowerPoint, Prezi, etc.)	10	20
3	Programs or tools for creating video content	0	5
4	Course management systems (Moodle, etc.)	0	16
5	Software for presentation activation (Adobe Presenter)	0	1
	Total	30	57

The results of the survey demonstrate that the professors from URFU and LUT use very similar technological tool-kit in their teaching. All the respondents from URFU and 75% from LUT use feedback systems, emphasizing testing and vote systems. In Ural Federal University a grading-rating evaluation system operates, where the results are recorded with the use of controlling-tests. Furthermore, there are specifically composed standardized tests utilized during exams. As an example, the Russian Scientific and Research Institute of Educational Quality Management/ Monitoring develops online exams for professors in higher education institutions. The LUT professors also use test systems for examinations and to monitor in-class activity.

All the participants from LUT and half from URFU employ presentation software in their lectures. It is worth mentioning that PowerPoint slides became an essential tool accompanying lectures. Still poorly equipped classrooms (without a computer, a blackboard, etc.) in Russian universities hinder easy-going software application.

A considerable part of the professors from LUT use Learning Management System (Moodle) in their everyday teaching. The Moodle system is a part of the course database platforms, which allows professors to upload, create, update materials and share them with students. Students learn through the Moodle system by watching videos, reading materials, quizzes, assignments and other course elements alongside with in-class face-to-face meetings. Some of the respondents in LUT also mention that they use video creation tools. Currently, Adobe Connect and Echo360 are the most commonly used solutions in university. Both these tools give a chance to create two-screen videos with presentation on one screen and personal presence of a professor on the second one. The videos for the two screens can be recorded simultaneously or separately by the teacher in front of the web-camera. There is a supporting team in LUT that helps to use technological tools.

Coping with the identified barriers faced by professors and initial movements in technology usage become the first steps towards he development and implementation of the flipped classroom.

4. Conclusion

Flipped classroom methodology is still not widely introduced in higher education arrangement. According to the results of the survey, the level of awareness of the professors from the Lappeenranta University of Technology is considerably higher than that of their counterparts from Ural Federal University. The Russian teachers do not implement the flipped classroom in their everyday classes, opting for the traditional and active classroom.

Both groups of respondents lay a special emphasis on the barriers decelerating the implementation of the inverted classroom. The teachers are primarily concerned with the lack of time for material preparation, team organization and technological support (programmers, video-developers, editors, etc.). At the same time, some professors have already employed a wide range of technologies, which can become an initial basis for the flipped classroom implementation in the future.

We strongly believe that the flipped classroom, as an innovative technique, contributes to modernization of the traditional educational approach. With the

flipped classroom, a student will play a role of an active self-learner and researcher rather than a passive consumer of educational service. The major difference and benefit for the professor is forming student-centered relations, where the professor tends to be a friend, main advisor and facilitator of the educational process, revealing the unpredictable world of science for their students.

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